c) équation cartésienne trajectoire du sucre

$$\begin{cases} x = (v_E \cos\beta)\, t \\ y = -\frac{1}{2} g t^2 + (v_E \sin\beta)\, t \end{cases}$$

$t = \dfrac{x}{v_E \cos\beta}$. On remplace :

$$y = -\frac{1}{2} g \left(\frac{x}{v_E \cos\beta}\right)^2 + \left(v_E \sin\beta\right)\left(\frac{x}{v_E \cos\beta}\right)$$

$$y = \frac{-g}{2(v_E \cos\beta)^2} x^2 + (\tan\beta) x$$

$$y' = \cancel{2} \times \frac{-g}{\cancel{2}(v_E \cos\beta)^2} x + \tan\beta .$$

$y' = 0$ pour $x = D$.

$$-\frac{g}{v_E^2 \cos\beta^2} \times D + \tan\beta = 0$$

$$-\frac{g}{v_E^2 \cos\beta^2} D = -\tan\beta$$

$$gD = \tan\beta \times v_E^2 \times \cos\beta^2$$

$$gD = \frac{\sin\beta}{\cancel{\cos\beta}} \times \cancel{\cos\beta^2} \times v_E^2$$

$$gD = \sin\beta \times \cos\beta \times v_E^2 .$$